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Journal of the Society of Arts.

FRIDAY, DECEMBER 15, 1854.

FIFTH ORDINARY MEETING.

WEDNESDAY, DECEMBER 13, 1854.

The Fifth Ordinary Meeting of the One Hundred and First Session, was held on Wednesday, the 13th instant, James Wilson, Esq., M.P., in the chair.

The following Candidates were balloted for, and duly elected :—

As Ordinary Members.

Browning, William. | Jackson, James Barwick.
Williams, J. F.

As Corresponding Members.

Crawcour, Dr. | Le Play, F.

The paper read was

ON THE GROWTH AND EXPANSION OF OUR FOREIGN AND COLONIAL TRADE IN IRON, AND THE FISCAL OBSTRUCTIONS TO ITS EXTENSION.

By HARRY SCRIVENOR, OF LIVERPOOL.

In compliance with the request of the Council of this Society, to prepare a paper "*On the Growth and Expansion of our Foreign and Colonial Trade in Iron, and the Fiscal Obstructions to its Extension*," I have arranged the materials I had at hand, and, to the best of my ability, I have sought to carry out what I consider to be the wish of the Council.

In treating upon a subject which must be allowed to be of great importance, I have had the difficulty which all for the first time have experienced, of appearing in an entirely new position, my ideas and intentions never having led me to even the thought of appearing before any assembly to occupy their time with reading a paper of my own compilation; and much more must I feel the delicacy and difficulty of that position when the composition of this assembly is taken into consideration. I, however, am aware that true genius is accompanied by genuine kindness of feeling, and my deficiencies will be excused when it enters the minds of those about me, that it was more consistent that I should attempt to comply with the wish of the Council, rather than have declined on the ground that I had never done anything of the kind before. I gave the *doubt* in favour of the trial.

There is an uncertainty respecting the knowledge the Ancient Britons had of iron. From Cæsar's observation, that they use either brass or iron rings and plates of a certain weight for money, we might be led to the conclusion that it was a very scarce metal, which is hardly consistent with the knowledge which the Gauls, their near neighbours, had of mining, who are stated by Strabo and Cæsar to have "great iron works, and every kind of mine;" and Strabo mentions iron as one of the British exports. Their early connection also with the Phenicians, who were well acquainted with iron, would lead the Britons to estimate the value of this metal.

After the Romans obtained quiet possession of the country, it was the object of Agricola to promote the arts, and Adrian, in the year 121, established at Bath the great military forge, or college of armourers. His successors continued to work the iron mines till the final abandonment of Britain by the Romans, about the year 409.

The conquest of Britain by the Saxons was at first

nearly destructive of all energy in the arts, especially as relates to mines. But Camden states, that in and before the reign of William the Conqueror the chief trade in the city of Gloucester was forging of iron, which Giraldus Cambrensis says was supplied from the forest of Dean. During the period from the Conquest to the death of John, iron and steel were imported from Germany and other countries.

By an act passed in the reign of Edward the Third, no iron manufactured in England, and also no iron imported and sold, could be carried out of the country, under the penalty of forfeiting double the quantity to the king; and the magistrates were empowered to regulate the selling price, and to punish those who sold at too dear a rate, according to the extent of the transaction. This act remained in force till the reign of William and Mary.

During the fourteenth and fifteenth centuries, several improvements had taken place in the manufactures of iron and steel, and upon a petition from the manufacturers of London and other towns, an act was passed in 1483 against the importation of various articles of home production.

We have no particular information of the progress in the manufacture till the reign of Elizabeth—but there is no doubt of the works having materially increased, as both Leland and Camden speak of iron works in many parts of the country.

In the reign of Elizabeth, acts were passed for the protection of timber,—that it should not be felled in certain districts for making iron,—that no new iron-works should be erected within 22 miles of London, nor within 14 miles of the River Thames; and a subsequent act prohibited the erection of any new iron-works in Surrey, Kent, and Sussex, and that no timber of the size of one-foot square at the stub, should be used as fuel at any iron work.

The consequent scarcity of fuel compelled those interested in the manufacture, to turn their attention to pit-coal, and there is a most interesting account by Dudley Dudley of his various experiments in its use for the smelting of iron,—his success, however, was not equal to his exertions, and it was not till the early part of the next century that it came into use.

In 1720, celebrated in the annals of our history for the great South Sea speculation, Mr. William Wood, the patentee of the Irish Halfpence, who is satirised by Swift in his Prometheus, endeavoured to establish an Iron Company; he wrote a pamphlet to prove that while we used about 30,000 tons of iron a year, of which we bought 20,000 tons at 10*l.* per ton, England possessed within herself all the essentials for the manufacture. The distress which ensued on the bursting of the South Sea bubble put a stop to this and all the other schemes of the day.

Attention was called to the encouragement of the make of pig-iron in our American colonies, and in the year 1750, an act was passed, that pig-iron made in the British colonies in America, may be imported duty free, and bar-iron into the port of London; no bar-iron so imported to be carried coastwise, or to be landed at any port, except for the use of his Majesty's dockyards; and not to be carried beyond ten miles from London. The act contained the following clause :—

"That from and after the 24th June, 1750, no mill or other engine for slitting or rolling of iron, or any plating forge, to work with a tilt-hammer, or any furnace for making steel, shall be erected, or after such erection continued in any of his Majesty's colonies of America."

This act was amended in 1756, extending the importation of bar-iron to *all* the ports of Great Britain, and the opposers of this amendment obtained the repeal of an act of Henry the 8th, which prohibited the conversion of coppice or underwood into pasture or tillage. But the importation till the time of the war never averaged above 4000 tons a year.

We had now to look to foreign countries, the principal of which were Sweden and Russia, for the necessary supply of iron. From these countries we received from *forty*

to fifty thousand tons per annum, which continued till the insane conduct of the Emperor Paul of Russia, in 1801, who, in consequence of our resisting his claim to Malta, confiscated our ships, and sent the crews to Siberia, drove us back on our own resources, and with the aid of the blast-engine and improved machinery, we were soon able to do altogether without the assistance of Russia, except as regarded the better descriptions of iron for the manufacture of steel.

The introduction of the blast-engine, the use of coal in the furnaces, and various improvements which took place in the manufacture, I have considered at length in my work on the iron trade, they would be out of place in the present paper. These improvements increased the make so considerably, that in the year 1797, Mr. Pitt, then Chancellor of the Exchequer, proposed laying a duty of 20s. per ton on pig-iron, but after full consideration he abandoned the idea. Lord Henry Petty, however, revived the subject in 1806, the make then being 250,000 tons. He proposed to levy a duty of 40s. per ton on pig-iron, as a war tax, and submit the various processes to the constant inspection of the Excise officers. There was a strong opposition to this measure; amongst other reasons it was stated that the manufacture of iron had this peculiar recommendation, that it had arisen and flourished most in those parts of the country which nature seemed to have doomed to everlasting sterility; and, as Mr. Wilberforce observed, he had never felt a more sensible pleasure in his life than when, after the lapse of a few years, he had returned to a spot once rugged and barren, but then covered by the fruits of human industry, and gladdened by the face of man, in consequence of the introduction of this manufacture.

Notwithstanding a most powerful opposition, the ministers persisted in carrying the bill into committee, but in a few days after the house had resolved itself into a committee, the ministers were induced to abandon the measure.

The great increase in the make, and the demand which arose for new applications of this metal, which required the assistance of foreign iron, gave such confidence in the success of the trade, that in the year 1825, Mr. Herries, Chancellor of the Exchequer, on bringing forward the budget, proposed a considerable reduction in the duties. The duty on foreign bar-iron had gradually risen since 1782 from 2*l.* 16*s.* 2*d.* per ton, to 6*l.* 10*s.* per ton. He said the price of iron has lately risen to an enormous height, (it was 15*l.* 10*s.* per ton in London), not from any new speculations in that article, not from any belief that the country was to be covered with iron railroads, and that all the iron which could be dug out of the earth would be required to supply the demand, but from a general increase of trade, produced by the increased and increasing comforts and prosperity of the people in this and other nations. The fact was, the supply of iron in this country was not at all in proportion to the demand.

Mr. Huskisson, President of the Board of Trade, proposed the alterations in the duties—and the duty on bar-iron was reduced to 30*s.* per ton. The resolutions were agreed to, and came into operation on the 5th of January, 1826.

By the desire of Government a comparative statement was prepared of the quantity of pig-iron made in Great Britain in the years 1823 and 1830. It appeared that the make in 1823 was 450,000 tons, and in 1830 it was 670,000 tons. Mr. Poulett Thompson, in his speech on the Navigation Laws and Commercial Policy, in May, 1832, referred to this great increase in the manufacture of iron.

In 1829, Mr. Neilson, of Glasgow, took out his patent for the application of *hot blast* in the manufacture of cast-iron—and this, aiding the *blackband ironstone*, had such an effect, that in about twenty years the make in Scotland rose from 35,000 tons to 800,000 tons, and the general make of the country, in about fourteen years from the reduction of the duty on foreign iron, increased to 1,300,000 tons; in 1847 it was 2,000,000 tons, and in

the years 1851 and 1852 it averaged about 2,700,000 tons.

In noticing the opposition we have had to encounter in foreign countries, the *nature* of the iron manufacture must be taken into consideration. This nation has, for many years, been favoured by circumstances as a manufacturing country. We possess, as regards iron, the best and most suitable coals—we have excellent descriptions of ironstone and limestone, and these, in most instances, found together. We have had that security which alone could warrant the large investment of capital required for the efficient carrying out of this manufacture—feeling, that were we sow there shall we reap. No other country has had equal advantages;—either they are without coal, or have had war at their gates. The former will apply to Russia and Sweden; the latter to France, Germany, Prussia, Austria, and other European states. America will be noticed by itself.

It must be understood that, where charcoal is solely used, the quantity of iron made will necessarily be limited. The engine which, by its power, now forces its blast into an immense and dense mass of materials, would be entirely unsuited to a charcoal furnace. The complaint formerly was far more general—that, insufficient as the blast would appear to us, it was too powerful, rather than that it was not powerful enough. The make, therefore, of Russia and Sweden has not been, and cannot be, materially increased.

Mr. Wærn, a member of the Swedish Diet, considers that the reason why the make in Sweden does not increase, is owing to certain duties and restrictions on the part of the Government, and early in this year he brought forward a motion in the Diet, “on the repeal of the taxes on pig and bar iron, as well as of the privileges still in favour of the mining districts and ironworks of Sweden.” He wrote a treatise on the subject, a copy of which he was kind enough to send to me. He has made curious, and, he says, “*accurate calculations*” to support his theory. Amongst others, he observes, if we compare the countries which chiefly produce iron for the twenty years ending in 1850, we find that—

Great Britain increased	244 per cent.
United States of America	171 ”
France	141 ”
German Customs Union	60 ”
Austria	130 ”
Belgium	217 ”
Russia	20 ”
Sweden	51 ”

and thus the production has increased more rapidly in every country than in Sweden, with the single exception of Russia. Now, if we compare the total production of these countries twenty years ago and that of Sweden at the same time, with what it is now, we find that the production of this country has suffered a decrease of from 1-16th to 1-32nd. I think Mr. Wærn is wrong in his expectation that any modification of the Government restrictions will materially assist in increasing the *make*. The difficulty Sweden has to contend against is the want of *coal*; and instead of an attempt to increase the manufacture, a more certain benefit might be derived by permitting the exportation of iron ore, which could be shipped with advantage to Newcastle, and smelted in our furnaces.

Some considerable reductions of late years have been made in Russia in the duties on the *manufactures* of Iron—and some not quite so favourable in Sweden—but they have too great a confidence in their own resources to allow of the importation of pig and bar-iron; besides which, they are likely to have a greater quantity of their own iron for home consumption, as their exports will probably decrease rather than increase, in consequence of several most important discoveries and improvements in the manufacture of steel. Whenever our manufactures are advantageous to Russia, they find their way there;

Russia has been for some years our principal customer for machinery and mill work, and has taken many thousand tons of our rails.

With regard to other countries of Europe, but more particularly France, which may be taken as a type of the whole, the war, and consequent interruption to commerce, caused several manufactures to grow up in France, or considerably to extend those already in existence, for the successful prosecution of which she was not, under ordinary circumstances, anywise fitted; of these iron may be specified as one. The extraordinary demand for war-like instruments gave a powerful stimulus to this manufacture, and when peace was restored, those engaged in it became involved in considerable difficulties. These, however severe they might be in the first instance, were not of a nature that could have continued for any lengthened period; the manufacturers would gradually have changed their business, and instead of producing cannon and muskets, they would have learnt to produce those improved agricultural or manufacturing implements that were either unknown in France, or obtained only from the foreigner; but matters were not allowed thus to adjust themselves. The ironmasters represented to government that they were in a state of extreme distress, and that this distress was occasioned by the importation of foreign iron, and not by the transition from *war to peace*. The government lent a favourable ear to these representations, and in consequence, the duty on foreign iron, which had continued at 2 fr. 20 c. the 100 kilogrammes from the year 1790, was raised in 1814 to 15 fr., being an increase of nearly seven times its previous amount. This, however, was not found sufficient to secure to the ironmasters that monopoly which they were anxious to obtain, and in 1821 they again represented that the increase of duty was insufficient for their protection, and on the 3rd of November in the same year an ordinance was published relative to the importation of foreign iron manufactured by rolling, in fact, *English iron*. It was ordered that, from fifteen days after the publication of the ordinance, all such iron when imported shall be placed in *bond*, and shall afterwards pay the duty which may be fixed by law when taken out of the warehouse for consumption.

The duty was raised from 15 fr. to 25 fr., the 100 kilogrammes.

Notwithstanding the tariff of 1822, the trade was not so profitable as it was before that period. An extensive ironmaster said, we made some profit when we sold at 450fr. the 1040 kilogrammes, or the ton, and we are losers in selling at 500fr., the cause of which is, that in 1819 the *banne* of charcoal cost 18fr. 3c., while it now costs 37fr. 50c. The proprietors of wood, the landowners, received the profit; and as Messrs. Villiers and Bowring, a commission appointed in 1831, in their report on the commercial relations between France and Great Britain, observe:—"In France, a large proportion of those who are interested in the continuance of the existing commercial system are elevated public functionaries, or are placed in immediate contact with them."

The report further observes:—"The annual sacrifice made by the agriculturists to the protected ironmasters, has been frequently allowed to be not less than from 1,500,000l. to 2,000,000l. per annum. The average difference of price between England and France, for the last twenty years, has been more than 10l. per ton; and taking the consumption at one hundred and sixty thousand tons a year, the smallest annual loss is 1,600,000l. The law of 1822 has been more than ten years—that of 1814 was eight years, in operation. They have cost the French people above 30,000,000l. While on the one hand, the revenue is diminished by the operation of the restrictive system, on the other the expenses of the state are increased whenever purchases are made for the public service. The annual purchase of iron, for instance, for the naval and military services, amounts to ten million francs, of which considerably more than one-half would be saved if foreign iron were admitted at a moderate duty.

The French government proposed that in 1835 the duty should be reduced one-tenth, and in 1838 another one-tenth; there were also certain concessions, as regarded the importation weight of pig-iron; and on the 22nd November, 1853, the tariff was fixed as follows:—

Bar-iron, former duty 6l. 12s. per ton, reduced to 5l. 5s. 10d. till the 1st January, 1855, and then to 4l. 8s. per ton. Pig-iron, former duty 2l. 16s. 8d. per ton, reduced to 2l. 4s. till the 1st January, 1855, and then to 1l. 15s. 4d. per ton. This most probably is all the amelioration we are to expect; it may not be so much as was anticipated, but the iron manufacture of France is not only increasing, but will in all probability still further and largely increase, in common with the German States, particularly Prussia, which has great mineral resources. A French writer (M. de Villefosse) remarked, that what is called in France the price of iron, is in fact the question of the price of *fuel* and the *means of communication*. The materials necessary for the manufacture of iron on the Continent are abundant, but they are seldom, if ever, found together as they are in this country, and therefore the strength of the remark is evident; but a great change is taking place. On looking at our exports, we find a considerable increase of shipments to all the States of Europe. This increase is not for general uses, but is the supply of material for those means of communication of which they have hitherto been debarred, and which will hereafter render them still more independent of our assistance.

I will now refer to America, a more important part of the subject, as regards our exports.

On the 8th of February, 1830, Mr. Cambreleng, the Chairman of the Committee on Commerce and Navigation, submitted to the House of Representatives of the United States his celebrated report, *deprecating the system of commercial restrictions*. He says:—"In 1807 the outrages of the two great powers, England and France, made it necessary to commence a series of irregular restrictions on trade, which led to the war of 1812, and terminated finally with that contest in 1815. Previous to these political restrictions, from 1789 to 1807, our country presented a spectacle of prosperity which had never been surpassed by any nation in any age. We had been suddenly emancipated from a colonial condition; we had not then learned to intermeddle with private employments; we had no heavy taxes to encourage smuggling, to diminish consumption, and repress industry; we had no stimulants but profit and enterprise; no guides but intelligence and judgment; we had, it is true, discriminations, minute and manifold, but happily for the country, our imports were moderate, our speculations harmless, and our trade was free. The succeeding eight years of restrictions and war checked the natural and rapid march of our industry, and drove us into employments new and unsuited to our age and condition.

The peace of 1815 naturally restored us to our old occupations, and the sudden reaction of the tide of commerce swept away a large portion of capital which had been prematurely invested.

It was to protect an employment new and unsuited to the "age and condition" of the United States, that heavy duties were placed upon the importation of iron.

From the 30th June 1816, the duty on bar-iron was fixed at 6l. 5s. per ton, at which it remained till 1828, when it was raised to 7l. 14s. 2d. per ton. On pig-iron, the duty was fixed at 20 per cent., *ad valorem*, till 1818, when it was altered to 2l. 1s. 8d. per ton, and in 1828 it was raised to 2l. 12s. 1d. per ton.

Mr. Cambreleng observes on these duties:—"Our present tariff is certainly *national* in one respect, it is *injurious* to every interest and to every section of the country."

No alteration was made till the following session, when an act was passed on the 14th July, 1832, which reduced the duty on bar-iron to 6l. 5s. per ton, and on pig-iron to 2l. 1s. 8d. per ton. This alteration in the tariff was far from being satisfactory to the state of *South Carolina*, which persisted in opposing these laws, on the ground that

it was unconstitutional to impose taxes with the view of protecting particular interests.

They called a convention of the state for the purpose of declaring the tariffs of 1828 and 1832 null and void within its limits; and this was not only done, but the legislature was directed to pass laws prohibiting the collection of duties, and punishing any person who shall dare to do so after the 1st of February, 1833.

This led to what has been called the *Compromise Act*, which was approved by the president on the 2nd of March, 1833. By this act, in all cases where duties on foreign imports shall exceed 20 per cent. on the value thereof, a gradual reduction shall be made till the 30th of June, 1842, when any residue of excess, above 20 per cent., shall be deducted.

The law was allowed to take effect for a few years, but as the reductions came into operation, the manufacturers set up fresh claims for protection, and in 1842 an act was passed which came into operation on the 29th of August of that year, raising the duty on bar-iron to 5*l.* 4*s.* 2*d.* per ton, and on pig-iron to 1*l.* 17*s.* 6*d.*

Happily this state of things did not last many years. The great commercial reforms effected in this country, and more especially the change in the *Corn-laws*, had a powerful influence in the United States, and the *Government* having profited by these and other circumstances, succeeded in carrying a comparatively liberal tariff, which took effect from the 1st of December, 1846—fixing an *ad valorem* duty of 30 per cent. on all descriptions of iron, and 15 per cent. on steel.

In the statement of American duties, I have given those fixed on *rolled or English iron*; hitherto, there has always been a considerable distinction in favour of *hammered iron*, as not so directly coming into competition with the manufacture of the United States. The great boon to England in the present tariff is, that this distinction is altogether done away with, and we enter on equal terms with the make of Russia and Sweden. I have endeavoured to give a connected sketch of the progress of the manufacture, and the various *fiscal obstructions* which have been thrown in the way of our foreign trade. I will in conclusion refer to “*the growth and expansion of our foreign and colonial trade in iron.*”

In the table which accompanies this paper, I have commenced the exports from 1796, having parliamentary returns from that date, but to give a more correct idea of the advancement of our colonial and foreign trade, I have taken certain years, when all matters connected with the war, had settled down, and in which years authentic returns having been made of the production of iron, I have been enabled to show the per-centage of export upon make.

Pliny says, “By means of iron and steel we build houses, hew quarries, and cut in stone; yea, and in one word, *we apply it to all the necessary uses of this life.*”

What Pliny asserts, the experience of eighteen centuries has confirmed. From the delicate and beautiful spring chain of a watch to the great experimental steam ship *Leviathan*, all is iron. To almost every new invention the adaptation of iron is so obvious, that it is at once resorted to to supply the required want; we have become dependent upon it, as a matter of course, and it is so familiar to our sight, that we pass it unnoticed. But if it were lost to our use, should we not, as Locke observes, “In a few ages, be unavoidably reduced to the wants and ignorance of the ancient savage Americans, whose natural endowments and provisions came no way short of those of the most flourishing and polite nations. Truly may he, who first made known the use of this mineral, be styled the *Father of Arts and Author of Plenty.*”

It would not altogether be correct to judge of the progress of civilisation by the consumption of iron; a calculation by Mr. Wörn shows that in Russia it is less than in other civilised nations, and that Sweden and Austria follow closely in her wake. He has reduced all kinds of

iron into pig-iron, and makes the following statement of the year 1850:—

In the United States of America the consumption was . . . per head			88lbs.
Great Britain	.	.	81
France	.	.	36
Hanover and Oldenburg	.	.	29
German Customs Union	.	.	24
Switzerland	.	.	18
Sweden	.	.	11½
Austria	.	.	11
Russia	.	.	8

Mr. Wörn is rather anxious as regards Sweden, and says, at present there is reason to believe that the consumption is 14lbs. per head.

The requirement of iron is *progressive*; it is a progress which we do not easily estimate, because, ourselves and all about us being habituated to the use of it from our infancy, it is what we neither experience nor observe.

The great step in advance is the railroad. This description of iron is only to be met with to any extent in England. It does not come into competition with any home manufacture; it is a national requirement, and must be admitted by a *total abandonment, or by a great reduction of duty*. A railroad requires many appendages of iron; these have either to be supplied in the country itself, or its dependence on England be acknowledged, and many years must necessarily elapse before any nation can compete with us in this description of iron. No *fiscal obstructions* interpose; and while an *iron network* is covering foreign lands, so must our manufacture be the chief source of supply.

With respect to the usual descriptions of iron, all countries which are dependent on others will come to us; we can make it cheaper, and it is readily supplied of any size. As regards iron making countries, with the exception of Russia and Sweden, it must be a matter of cost. By a report of the Secretary of the Treasury of the United States, in compliance with a resolution of the Senate, of March 28, 1853, it appears that on the average of ten years, from 1843 to 1852, we have been able to compete with America in her own markets. The average price of pig-iron at Glasgow being 2*l.* 15*s.*; at New York, 5*l.* 11*s.* 6*d.*; and at Pittsburg, 5*l.* 10*s.* 8*d.*

The average price of bar-iron at Liverpool, 6*l.* 12*s.* 5*d.*; at New York, 11*l.* 15*s.* 6*d.*; and at Pittsburg, 11*l.* 11*s.* I have appended to this paper a *schedule of the foreign tariffs*, for the years 1846 and 1853, showing the changes which have been made during that period, and the per centage of increase and decrease in the duties. The decrease in many instances is considerable, and it does not appear to me that it is either likely that any further reduction will at present be made, or that it is of much importance to our trade.

Many European States will no doubt push the manufacture as facilities are increased for the working of the mines, but not to a sufficient extent to drive us out of their or other markets, provided we can manage to make our iron at a moderate cost; we ought to do so, no *fiscal obstruction* stands in the way. As *customers* for the purchase of our wares, we have, besides our competition in the markets of ironmaking countries, the *countries dependent on a supply*; and our own colonies, with all the *predilections* of Englishmen for the use of iron. But the extent of our foreign and colonial trade depends principally on the cost, not on the duty.

In the following statement I have reduced all our exports, with the exception of hardwares and cutlery, into pig-iron, and it shows the percentage of export on make, to have been in 1828, 24 per cent.; 1830, 25*l.* per cent.; 1839, 26*l.* per cent.; 1847, 37*l.* per cent.; and the average of 1851 and 1852, 50 per cent. The declared value of all exports of British iron and unwrought steel, including hardwares and cutlery, machinery, and mill-work, was in

1823, 2,111,448*l.*; 1830, 2,698,226*l.*; 1839, 5,231,631*l.*; 1847, 8,870,775*l.*; and in 1851, 8,594,961*l.*

The proportion from different ports, at which the shipments for 1851 were made, is as follows:—

London	£1,582,498
Liverpool	4,813,773
Bristol	223,217
Hull	1,073,732
Other English Ports	320,981
Total, English Ports	£8,014,201
„ Scotch Ports	561,819
„ Irish Ports	18,941
Together	£8,594,961

The great difficulty England has to contend with is *labour*; in that word, iron is really described. The iron manufacture of *all trades*, is that in which, if it were possible, a fair and reasonable understanding should be come to between the masters and men. In the great iron district of South Wales, this might, and probably has to some extent been carried out, because, around many of the larger works, a native population has sprung up, who are aware of their dependence on the works; it is true they have had occasional outbreaks; but nevertheless, from my own experience, they are generally open to reason.

But in South Staffordshire, from the intermixture of iron works and sale collieries, anything like an arrangement seems impossible. I am, however, satisfied that a reason-

able rate of wages is more advantageous to the men and their families, than the high rates for which they occasionally contend; and a moderate cost of iron is likely to be of more permanent benefit to the ironmasters.

I will close my paper by reading an extract from a letter, bearing upon this point, from a friend at Marseilles, a practical, and very sensible person; it is dated June, 1854:—

“A material change has taken place in the relative positions of the iron trade in France and England during the last five or six years. The increased number of works, and the improved modes of working, *with the moderate wages paid in France*, have tended to render French iron cheaper; and now that wages and the price of coal and ironstone in England are so high, and with a brisk demand for iron, we find ourselves able to manufacture iron in France nearly as cheap as we could get it in England, even if the duty were taken off. At our forge we roll from ten to twelve tons of boiler plates *per diem*, of superior quality, as they are principally made from scrap—and these plates do not cost us more than 15*l.* to 16*l.* per ton. At present English prices, we certainly could not import them for less, independent of duty.

“It has been my opinion for some time past that *strikes* would deprive England of much of her foreign trade in iron, *for in all parts of the world the materials for makin*g* it are to be found, and we are more economical in the use of our fuel, a thing but little attended to in England.*”

I have applied high pressure to my condensing engine to confine this vast subject within moderate limits. I have laboured to be short; I trust that I have not been obscure.

EXPORTS OF BRITISH IRON, INCLUDING UNWROUGHT STEEL.

Where to.	Years	AVERAGE.		1815.	1823.	1830.	1839.	1847.	1851.	1852.
		1796 to 1805.	1806 to 1812.							
		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Colonies		13,780	18,842	23,611	29,272	39,847	58,630	71,127	159,709	141,460
United States		6,169	5,605	12,720	9,921	15,154	74,772	137,983	464,559	501,153
Other Countries		4,168	6,517	12,120	34,757	62,047	114,510	340,599	295,211	393,266
Total Tons		a 24,117	a 30,964	48,451	73,950	117,048	247,912	549,709	919,479	1,035,884
Declared value				1,090,936	878,918	1,078,523	2,719,825	5,265,779	4,599,339	no return
Make of Iron . . . Tons		b 125,000	c 258,000	no return	450,000	670,000	1,300,000	2,000,000	2,700,000	

HARDWARE AND CUTLERY, declared value.

	£	£	£	£	£	£	£	£	£
Colonies			423,492	267,328	317,356	444,560	547,252	527,879	704,655
United States			1,196,485	422,130	662,126	849,640	931,203	1,080,487	968,493
Other Countries			541,584	385,226	431,454	534,321	863,526	1,218,645	1,018,549
Total £			2,161,561	1,074,684	1,410,936	1,828,521	2,341,981	2,827,011	2,691,697
Quantity . . Tons			14,363	9,095	13,369	21,177	20,615	27,625	25,290
MACHINERY AND MILLWORK.									
Declared value . . £				157,846	208,767	683,285	1,263,015	1,168,611	no return
Total value of Exports . £	2,413,273	no return	3,252,497	2,111,448	2,698,226	5,231,631	8,870,775	8,594,961	incompt.

a a Including Hardware and Cutlery.

b The make of 1796.

c The make of 1806.

d This large amount is attributable to the heavy shipments at the close of the war.

AVERAGE PRICES OF BAR AND PIG IRON.

Bar Iron at Liverpool.			Pig Iron at Glasgow.
Years.	Per Ton.		Per Ton.
1806 to 1812 . . .	£14 17 6		
1815 . . .	12 2 6		
1823 . . .	8 0 0		
1830 . . .	6 0 0		
1839 . . .	9 17 6		
1847 . . .	9 6 0	£3 12 6	
1851 . . .	5 0 0	2 0 9	
1852 . . .	5 14 6	2 3 6	

The average price of Pig Iron at Glasgow for 10 years, from the 1st January, 1842, to the 1st January, 1852, was £2 16s. 8d. per ton.

TARIFFS OF FOREIGN COUNTRIES RELATING TO IRON, with rates of Duty in the years 1846 and 1853, shewing the changes that were made within that period, with the per centage increase or decrease.

COUNTRIES.	per	Rates of Duty.						Increase per Cent.	Decrease per Cent.
		No change.	Changes made.						
			1846	1846	1853				
RUSSIA.									
Steel, all kinds, raw	cwt.	£ s. d.	£ s. d.	£ s. d.	£ s. d.				
Iron and steel wire and springs	"	...	0 12 6	0 7 9½	0 18 8	...		38	
Sheet iron, manufac- tured articles of all kinds	"	...	1 16 0	0 15 6½	...			57	
Sewing needles	lb.	...	0 13 6	0 5 6½	...			59½	
Packing needles, &c.	"	...	0 3 6½	0 1 5½	...			59½	
Swords	"	Prohibt.	Prohibt.	0 7 5	...	Proh			Rmd
Knives, &c.	"	...	0 4 6	0 2 7½	...			42½	
Fine cutlery	"	...	1 1 9	0 7 5	...			65½	
Saws, files, &c.	cwt.	...	0 15 4	0 10 4½	...			32½	
Smiths' work, forged, without filing or pol- ishing, as anchors, nails, &c.	"	...	1 16 2½	0 10 4½	...			70½	
Locks, hinges, screws, etc. unpolished	lb.	...	0 4 6	0 0 6½	...			87	
Do. polished, and steel pens	"	...	0 4 6	0 1 10½	...			57½	
Firearms, and parts thereof	"	...	1 1 9	0 4 5½	...			77½	
Prohibited—Pig and bar iron by sea.									
SWEDEN.									
Anchors	300lb.	...	0 10 0	0 8 4	...			16½	
Bar iron	"	...	0 5 0	Prohibt.	...				
Hoops	lb.	...	0 8 4	Prohibt.	...				
Scissors	1b.	...	0 5 10	0 2 8	...			54½	
Steel, cast	75lb.	...	0 3 4	0 2 2½	...			33½	
All other kinds except shear	"	Prohibt.	Prohibt.	0 5 0	...	Proh			Rmd
Nails, 2in. and upwards	320lb.	0 17 8½							
Other nails, and all wrought iron manu- factures made by hand or machinery	"	0 1 4							
Needles, sewing, etc.	lb.	0 0 8½							
Sword blades	"	0 0 4							
Cannon, bored	300lb.	0 13 4							
Do. unbored	"	0 6 8							
Hearths, above 1½ inch thickness	"	0 7 6							
Old castings, spoiled cannon and bombs	"	0 3 4							
Pots, kettles, etc.	"	0 10 0							
Castings for machinery	"	0 10 0							
Cast iron work, not otherwise specified	25 p.c.	ad val.							
Chain cables	300lb.	1 0 10							
Prohibited—Pig & Bal- last iron and old iron, and the Exportation of iron ore.									
NORWAY.									
Bar iron	5 cwt.	...	0 9 0	0 7 1	...			21½	

COUNTRIES.	per	Rates of Duty.						Increase per Cent.	Decrease per Cent.
		No change.	Changes made.						
			1846	1846	1853				
		£ s. d.	£ s. d.	£ s. d.					
NORWAY—Continued.									
Machinery for agricultural and industrial purposes.....	"	...	Free.	Same as raw material.					
Pig and old iron for re-melting	300 lb.	0 1 4							
Steel manufactures	"	0 0 2½							
DENMARK.									
Iron and steel wire	1b	...	0 7 0½	0 3 4½	...			52	
Ironmongery, coarse and rough	110½	...	0 7 0½	0 3 6½	...			50	
Do. fine and polished	"	...	0 7 0½	0 14 0½	100				
Do. incrustated, faulted, and plated	1½ lb.	...	0 1 1½	0 0 4½	...			66½	
Pig and old cast iron	100 lb.	Free.							
Bar and hoop	"	0 0 10							
Ballast	"	0 0 5½							
Nails and spikes, 3 in. and above	"	0 3 0							
Do. under 3 in.	"	0 4 8½							
Plates, hammered and rolled, if exceeding ½ in. in thickness.....	"	0 0 10							
Do. under ½ in. (black). Do. white, or tin plates (in boxes, 12 cwt.)	100 lb.	0 5 3							
Anchors	"	0 3 6½							
Chains, steam boilers, tanks, and anvils	"	0 3 6½							
Castings, cannon, etc.	"	1 8 1½							
Do. more highly polished	"								
Knitting implements, etc.	"	3 15 0							
HOLLAND.									
Iron, in blocks, pigs, ore, forged staves, rods, band and plate, and rails for railroads	...	...	1 fl. a. s.	1 fl. a. s.	...			50	
Anchors and cables	...	...	6 "	1 "	...			83½	
Machinery.....	...	...	6 "	1 "	...			83½	
BELGIUM.									
Tin plates, unwrought.....	cwt.	0 10 5							
Steam engines, fixed	"	0 6 3							
Do. for navigation	"	0 10 5							
Locomotives	"	0 14 7							
Carding machinery	"	1 11 3							
Tenders, boilers, etc.	"	0 8 4							
Unenumerated	"	0 10 5							
Machinery, detached pieces	"								
Castings	"	0 8 4							
Wrought iron	"	0 10 5							
GERMAN COMMERCIAL UNION.									
Iron, raw	cwt.	0 1 0							
Pig iron, rails; raw, cast, and refined steel	"	0 4 6							
Wrought iron, and in bars of ½ in.	"	0 4 6							
Do. less than ½ in.	"	0 7 6							
Wrought in a rough shape, for machinery, etc. weighing 1 cwt. and upwards	"	0 9 0							
Do. weighing less than 1 cwt.	"	0 18 0							
Ship chains	"	0 9 0							
Iron for fittings of locomotives	"	0 9 0							
Steel, polished plates	"	0 12 0							
Needles, knitting, etc. varnished wares, etc.	"	7 10 0							
FRANCE.									
Steel, raw, drawn	cwt.	...	2 1 8	1 8 4	...			32	
Do. cast, drawn	"	...	2 1 8	1 16 7	...			12½	
[The alterations in French duties noticed in paper.]									
SPAIN.									
Pig iron	101 lb.	...	0 1 8	0 2 1½	27½				
Bar iron	"	...	0 12 6	0 10 8½	...			14½	
Steam engines	"	...	Free	3 fl. a. s.	Dty. imp.				
Other engines or machinery	"	...	Specific	a. s.	...				

COUNTRIES.	per	Rates of Duty.						Increase per Cent.	Decrease per Cent.
		No change.	Changes made.						
			1846	1846	1853				
		£	s.	d.	£	s.	d.		
SPAIN—Continued.									
Cutlery—knives and forks, per doz. pair ...	from to	...	...	...	0 0 10	0 0 7½	...	25	
Rails, wheels, carts, etc. for working mines ...	101 lb.	0	2	7	0 1 8	0 2 0	...	20	
PORTUGAL.									
Pig and bar iron	100 lb.	...	...	...	0 1 5	0 0 4½	...	74½	
Sheet	"	...	...	...	0 1 0½	0 0 6½	...	48	
Hoops	"	...	...	...	0 1 0½	0 0 6½	...	48	
Chains, anchors, etc. ...	"	...	...	...	0 2 1	0 1 9½	...	14	
Wire	"	...	...	...	0 5 7½	0 6 9	...	21	
Steel, unwrought	"	...	...	...	0 2 1	0 0 8½	...	68	
Tools of all kinds	from to	...	...	...	0 11 3½	0 13 6	...	20	
Scissors	"	...	...	...	14 1 3	6 15 0	...	52	
Knives, wooden handles	"	...	...	...	2 16 3	2 14 0	...	4	
Do. bone	"	...	...	...	5 12 6	3 7 6	...	40	
Do. ivory	"	...	...	...	13 10 0½	1 0	...	70	
AUSTRIA.									
Iron, raw	100 $\frac{2}{100}$	...	...	...	0 8 4½	0 1 6	...	82	
Bars	"	...	...	...	0 12 0	0 5 0	...	58½	
All cast, hammered, and wrought work, house- hold wares, agricultu- ral implements, etc. ...	1 lb 100 $\frac{2}{100}$	from to	...	...	1 4 0	0 10 0	...	58½	91½
Fire-arms, razors, pen knives, surgical in- struments, etc.	"	...	...	...	6 8 4	2 10 0	...	61	
SARDINIA.									
Rails for railroads	cwt.	...	...	...	1 4 0	0 4 0	...	83½	
Anchors	"	...	...	...	0 8 0	0 4 0	...	50	
Wire	"	...	...	...	0 8 0	0 4 0	...	50	
Carriage springs	"	...	...	...	1 4 0	0 12 0	...	50	
Rods and agricultural implements	"	...	...	...	0 10 0	0 5 0	...	50	
Machinery, such as weav- ers' cards, etc.	"	...	...	...	0 4 0	0 2 0	...	50	
SWITZERLAND.									
Pig and bar iron	110½ lb.	...	...	...	0 0 1½	0 0 3	...		
Steel, unwrought	"	...	...	...	0 0 1½	0 0 7½	...		
Do. plated wire	"	...	...	...	0 0 1½	0 2 11	...		
Hardware, unwrought, cast, plates, stoves, wheels, etc.	"	...	...	...	0 0 1½	0 0 7½	...		
Cutlery of every descrip- tion	"	...	...	...	0 0 3	0 6 8	...		
Machinery of all sorts ...	"	...	...	...	0 0 3	0 6 8	...		
[The per centage in- crease in the new duties is omitted, as the duties in 1846 were only nomi- nal in effect; and the new duties, although ap- parently very high in comparison with the old duties, are but moderate when compared with those levied in other countries.]									
TURKEY.									
Iron in bars	125 lb.	...	...	...	0 0 3½	0 0 2½	...	28	
MEXICO.									
Pig iron	101 lb.	...	...	...	0 6 0	0 4 0	...	33½	
Bar iron	"	...	...	...	0 12 0	0 6 0	...	50	
Steel	"	...	...	...	0 8 0	0 6 0	...	25	

DISCUSSION.

MR. P. L. SIMMONDS said that the subject which they were met to consider had been most ably brought before them, but there were one or two points connected with the iron trade which he wished to lay more fully before the meeting. This had been well termed a metallic age, and from the various purposes to which iron could now be applied, the term appeared to him to be most expressive. It would seem that their Colonial demand for iron was likely to go on increasing from year to year. And Mr. Scrivenor had well shown that this country was better able to supply that demand than any other. It had also

been shown that the Colonies possessed vast mineral stores as yet undeveloped, should those of England fail, of which, however, he did not think there was any prospect. He would not go into details relative to the various purposes to which iron could be applied, but as Mr. Scrivenor had alluded to the net-work of iron roads by which this country was intersected, he might be allowed to add some few particulars to that gentleman's observations. Three years ago they had in this country only 7,000 miles of railroad under traffic, on which 2,500 engines were at work, whilst, including sidings, double lines, &c., they had now probably 25,000 miles at work, in the construction of which about 1,500,000 tons of iron had been consumed. In four or five years the United States would probably be traversed by 30,000 miles of railway, there being now in operation in the States upwards of 15,000 miles. In the British American Colonies there were also several thousand miles of railway in the course of construction, and on the Continent the number of miles in operation was probably not less than 12,000 miles. But there were other and most important purposes to which iron was being applied, such as the building of palaces, warehouses, dwellings, steamers, &c. Five years ago only eight per cent. of their steamers were built of iron, whilst now the proportion was not less than 70 or 80 per cent., and there was no doubt iron vessels would very shortly supersede wooden vessels altogether, if some anti-fouling composition could be discovered to keep their bottoms clean, and preserve the iron from the effects of the sea. When they saw that boiler-plates were being made weighing 1½ tons, engine-shafts of four tons, and cylinders of 28 or 30 tons, it was clear that the demand for iron must go on very naturally increasing. There were likewise other stupendous structures tending to increase the demand for iron. The high level bridge at Newcastle consumed 5000 tons of iron; the Menai bridge, 11,500 tons, and there was now constructing in Canada the Victoria bridge, across the St. Lawrence, which would be nearly two miles in length. There could also be no doubt that the conveniences and comforts of life were spreading far and wide the demand for gas and water pipes; and it was only about two months since that a firm in Glasgow took a contract for 36,500 tons of gas and water pipes; and the city of Melbourne alone required 19 miles of these pipes, and Rio Janeiro about 30 miles of gas pipes. Calcutta and other eastern towns were also in the market for contracts for pipes, lamp posts, gasometers, &c. There were several very valuable remarks made by Mr. Scrivenor on the consumption of iron in the United States, to which he thought he might be allowed to add one or two observations. A great increase had taken place in the value of iron and steel imported into the United States after the alteration of the tariff in 1846. Thus the imports of 1847 were valued at 5,500,000 dols. In 1848 they had increased to 12,500,000; in 1850 to 16,250,000; in 1851 to 17,500,000, and in 1852 to 21,500,000, and the increase was still going on. In 1842 the American import of bar and pig-iron was 100,055 tons, and the extent of production in the States amounted to 230,000. In the year 1846, under the altered tariff, the imports were 69,625 tons, and the home production 76,500 tons; but in 1851 the imports were 341,750 tons, and the production 41,300. According to the official returns of 1850, the production of pig-iron in the United States was 564,775 tons, and the wrought-iron made was stated at 272,044 tons. At the same period, the number of works for pig-iron were 375, and 422 were devoted to the manufacture of wrought-iron, of which number not less than 311 were in the coal state of Pennsylvania. Should the home supply of England prove, at any time, unequal to the demand, they had abundant deposits of iron-stone in many of their Colonies, viz. in Australia, in Canada, Nova Scotia, and many parts of India; and not only so, but they had plenty of wood, and in some places valuable deposits of coal to assist in its working and development. Four years ago a very valuable report was made by

Major Drummond to the East India Company on the subject of India iron, in which he said, "The centre of India, from Nerbudda to Assam, abounds in coal and iron stone formation, capable of yielding iron similar to that of Great Britain—the ore containing from 30 to 50 per cent. of metallic iron. The Himalayas, Gwalior, and other districts possess in great abundance the richer ores capable of yielding the superior iron of Cumberland, Sweden, and other parts of Europe. Accompanying these last are extensive forests, from which can be obtained in profusion the fuel necessary for their reduction, viz., wood charcoal." Much further important evidence could be adduced to prove the supplies of iron which might hereafter be obtained from India. He perfectly agreed with Mr. Scrivenor, that they would be able to hold their ground for a very lengthened period against foreign states; for, notwithstanding the high price of labour, the power they now possessed by the use of machinery was so great, and the saving thereby effected so important, that they felt the deprivation of labour much less than formerly. The monetary crisis of 1847 gave a temporary check to the production and export of iron from this country; but the gold discoveries, the extensive emigration, and the general prosperity of the Colonies, gave an additional impetus to the trade during the last few years, so that the make of iron in this country now approximated to 3,000,000 tons per annum. He understood Mr. Scrivenor to stop short in his paper with regard to his statements of the value of the metallic industry of the country. If he mistook not, that gentleman only gave the value of their machinery, hardware, and other iron manufactures down to 1851, when it was stated at 8,500,000*l.* Had he pursued his investigations, he would have found that the value had much increased since that time. Indeed, from 1849 to 1852, the value of their exports in hardware, machinery, &c., had steadily increased at about the rate of 1,000,000*l.* per annum, but in 1853 they reached 17,500,000*l.*, being an increase, in one year, of upwards of 6,000,000*l.*, and the exports of the present year, although they had been somewhat checked by adverse circumstances—the war—the glut of the Australian markets—the commercial disasters of America, &c., showed no falling off. Indeed, they would probably reach 18,000,000*l.*, the value for the first 10 months of the year being 15,250,000*l.* These facts he had deduced from the returns of the Board of Trade, and, therefore, they might be relied upon as accurate. He would not go through all the detailed accounts with which he was furnished, but would content himself with calling attention to a few items. In 1849, the declared value of the hardware and cutlery imported was rather less than 2,250,000*l.*, but in 1853 it had risen to upwards of 3,500,000*l.* The machinery and mill work in 1847 was 700,000*l.*, and in 1853 nearly 2,000,000*l.* In the same period their exports of iron and steel had increased from about 5,000,000*l.* to 11,000,000*l.*, and of tin plates, which formed a portion of iron manufacture, from 709,000*l.*, to 1,200,000*l.* The total showed that the declared value of iron manufactures exported had increased from 8,500,000*l.* in 1849, to 17,500,000*l.* in 1853, and in the present year it would probably exceed 18,000,000*l.* It must be remembered, in taking these figures into consideration, that the amount exported was little more than half their production. If they were, therefore, to double the declared value of their exports, they would arrive at about 36,000,000*l.* as the total value of the iron production of this country, exclusive of its other metallic produce; and the declared value, be it also remembered, was not equal to the real value. They would, however, see that in a little more than thirty years the value of their exports of iron had been increased by no less than 850 per cent. He did not know that he could add anything more to the observations he had already made, but he had thrown together these facts, believing that it was desirable to be in possession of the utmost information on the subject, and trusting that they might prove useful in its consideration.

Mr. W. Bird had attended the meeting more as a listener than as a speaker, and he was afraid, in the few observations which he proposed to make, he should not be able to add much to the instruction or interest contained in so able a paper as that of Mr. Scrivenor. There were so many valuable observations in that paper, and it embraced so wide a range, that it was almost impossible to pitch on any salient points on which to raise a discussion, or to bring objections against the observations made by the author. There was so much of the valuable paper laid before them in which he entirely agreed, that he was almost afraid to venture to make two or three remarks upon portions with which he disagreed. In the early part of his paper, Mr. Scrivenor endeavoured to show that the development of important manufactures was not materially affected by Government interference. He (Mr. Bird), on the contrary, maintained that, whenever the Government interfered with the manufacture of any article, it was invariably spoiled. So important a manufacture as that of iron—and he might be allowed to state that he spoke not of iron *per se*, but of cheap iron—could not for one moment exist, if by any extraordinary hallucination of Government, it was fettered by such a tax as that formerly proposed by Lord Henry Petty; and he trusted they would never have to oppose the imposition of such a tax. The date of the English iron trade, or of cheap iron, went no further back than the introduction of Neilson's hot-blast, which brought a large quantity of otherwise useless material into profitable working; yet so great was the prejudice in England against the hot-blast that it was a considerable time before it was brought into general use. When, however, it came into operation the production at once increased, and of so great importance did it become to the interests of the country, that whereas in 1832 the exports were only 146,000 tons, in 1853 they had increased to 1,250,000 tons. Indeed, in twenty years the exports had increased tenfold. The greater portion of that increase, as well as a large part of the home consumption, which had increased nearly threefold, or from 550,000 to 1,500,000 tons was to be attributed to the improved facilities, and the reduced cost of transit. The demand for iron caused by the railways, had produced a corresponding advantage in the reduction of the cost of its transit. This was a matter of great importance, and, therefore, he could not agree with Mr. Scrivenor, that the increase of these facilities abroad would make other countries independent of England. The more they encouraged the extension of railways on the continent—and thereby improved the facility of transit, the more able would we be, even with the disadvantage of the existing duties, to convey our pig-iron throughout the continent. If railway facilities were increased, English iron would become a staple article to assist in the payment of their cost, and, with their extension over the larger portion of Germany, the increase of the iron trade would, *pari passu*, advance. He did not, therefore, look upon the extension of railways as likely to shut them out from any portion of this trade, but rather as giving a greater area for its development. The facilities of transport, though largely increased during the last ten years, were not so great as to give them any cause of fear at the natural demand for iron from this country being in any way interfered with. Even in the Zollverein, Mr. Scrivenor stated, the production of iron had greatly increased; but they might depend upon it that where so much depended on the bars of rivers or freshes, on the state of the roads, and horse and cart traffic, it could not materially increase. Indeed, if there should be an epidemic amongst thirty or forty horses, or a waggoner got drunk, many furnaces in Silesia would be affected. He had received a letter only yesterday from his son, who was in that country, stating, of course in jest, that the roads were so bad that they had lost a horse and cart with a load of pig iron—no trace could be discovered of them. He could not help attri-

buting a large portion of the increase which had taken place in the consumption of iron to the low prices which prevailed in 1851, and to the effect of the Great Exhibition of that year. He had not the slightest doubt that the numerous foreigners who visited this country in that year, and saw the display which was made of raw materials, on their return home told the manufacturers of their respective countries that they must obtain their iron from this country. The result was that the price of pig-iron at Glasgow, which in 1851 was at 36s. per ton, had since been gradually rising, until it had at one period reached upwards of 90s. This showed that the Exhibition did great good to this country, and he believed that the exhibition which was to take place in Paris next year would be productive of equal good if our producers were careful to show good examples of raw materials. Mr. Simmonds had spoken of the railways, and though he might be correct as to the number of miles in operation, he (Mr. Bird) was convinced he was incorrect in regard to his estimate of the quantity of iron used in their construction. Mr. Simmonds had stated that quantity at 1,500,000 tons, but he believed that 2,500,000 would be nearer the mark. If, then, from abrasion or other causes, there was an average depreciation of the rails to the extent of ten per cent. in the year that would produce an annual demand of from 220,000 to 250,000 tons of iron per annum to make up for that depreciation. They would therefore see that every mile of railway laid down not only gave them a benefit in the first instance, but also caused a constant demand to make up for the abrasion or depreciation. The question of the effects of tariffs on the extension of the iron trade was one on which he begged most humbly to differ with Mr. Scrivenor. He thought that every fiscal regulation was an obstacle to the extension of the iron trade abroad, and altogether detrimental to national interests. On this subject Cambrelling truly remarked, "It is national in one respect—it is injurious to every interest and every section of the country." He was satisfied that the placing a duty on iron was to make it dear instead of cheap, and in order to make a producing iron country—destroyed that country as a consuming country. The advancement of a country in wealth and comfort was in proportion as it could obtain a plentiful and *cheap* supply of iron. Therefore they did an injury to a country, when, on the chance of making it a producing, they so far advanced the prices as to destroy it as a consuming country—as was the case in Prussia, here they had no rapid and cheap means of transit to carry their produce to market. If they took one of the largest works of Austria, which was within three miles of the Emperor Ferdinand's Northern Railway, they would find that the only means of transit was by common carts. It was no use making a country a producing one unless they had the means of conveying the article manufactured to the market when it was produced. To revert to the tariff regulations, there could be no doubt, if the Glasgow manufacturers could supply good pig-iron at 60s. or 70s. per ton—and before it was brought to the market it was raised by fiscal regulations to 150s.—th at the latter price must prove a great obstacle to the enlargement of trade, and therefore all argument and experience showed the value of cheap iron, and that the laying heavy duties upon it was politically and economically a great mistake. If they were to take a cargo of pig-iron and consign it to Vienna, its value would be raised by fiscal regulations to 10 per cent. above that of the Hungarian charcoal-iron, and yet it was admitted by Hungarians themselves that they did not mind paying more for a small portion of the Glasgow hot-blast iron to mix with their raw charcoal-iron. Let us follow a cargo of iron by the Elbe to Austria; it was stopped at Stade to pay an impost to Hanover, because one bank of the Elbe belonged to that country. If Hanover levied a duty, why should not also Denmark, which was situated on the opposite bank? After shifting the cargo at Hamburg into river boats, it was conveyed only a few miles, when it was stopped at Lauenburg to pay

toll to Denmark; it then proceeded to Mecklenburg, where it paid another toll—at Brunswick, another toll—and, on entering Prussia, another—so that, in fact, there was nothing but toll upon toll until the cargo arrived at Vienna. Could it be supposed that these fiscal duties were no obstacle, as Mr. Scrivenor said, to the sale of iron at its destination. These tariffs were the primary cause of the want of transit facilities; and if the continental powers would take off the duties, this country would first find the rails with which to make the railways, and afterwards carry iron over them to pay by the traffic for their construction. He thought there was no subject of greater importance to the interests alike of the continent and this country than the one now under consideration. If those countries imported the raw material from England at a cheap rate, they would be enabled to send back to this country cast-iron ornaments which it did not possess, and for which a fair and equitable rate would be paid in the pig-iron exported.

Mr. WINKWORTH said, that he rose with some hesitation after Mr. Bird, who had so fully and ably touched upon the most important topics arising out of the valuable paper which had originated the discussion. There was, however, one point to which he might, perhaps, venture to address himself for a few moments, although to some extent he had been anticipated by his friend. He alluded to the striking illustration which the comparatively recent history of the export trade in iron afforded of the salutary effect of reduced tariffs. The Society could not fail to have been struck with the remarkable augmentation of exports to the continent which had followed the relaxed duties of which Mr. Scrivenor had furnished us with the details. He (Mr. Winkworth) had looked over the statistical information on the subject which he found on the table, and regretted to find that, owing to the exceptional condition in which that country was now placed by the war, which had made, so lately as 1853, the largest reduction on the import duty on iron of any of the European states—he meant Russia—the full advantage of the policy could not be realised. He felt some hesitation in alluding to this circumstance, but as it was not a question of politics, but simply of political economy, he perhaps might be permitted to say that he hoped no antiquated prejudices on this subject would be allowed to interrupt that unfortunately limited trade between belligerent countries through neutral states, which, up to this moment, had existed. He was old enough to recollect the Berlin and Milan decrees, by which the first Napoleon had attempted to destroy the continental trade of Great Britain,—a policy scarcely less suicidal and absurd than that which influenced a man to burn a quantity of Bank of England notes to punish the directors for ceasing to pay, under legislative authority, in gold and silver. There were many products peculiar to this country, which Napoleon's subjects would or could not do without, and which, therefore, they could only obtain at an enormous advance on the cost. So, then, of the articles which Russia could best supply to this country, namely—tallow, hemp, and, perhaps, corn—could there be any adequate reason why we should not be permitted to exchange them for commodities of which that country stood most in need, such, for instance, as iron, wrought and manufactured, always excepting implements of war? All trade, when resolved into its ultimate principles, was barter, and we need not fear that the precious metals would be exported in payment for these Russian products to any serious extent, as the adverse state of the exchanges, which was the pulse by which to ascertain the sanitary condition of external commerce, would, at the proper time, prevent an undue efflux. It should, however, always be borne in mind, that even these metals could scarcely yet be deemed indigenous to these islands, and must, therefore, be previously bought with, or exchanged for, our manufactures. Commerce was the pioneer of civilisation, and he incurred a fearful responsibility who, under an erroneous estimate of its obli-

tions during a state of warfare, interposed additional obstacles to its free development.

Mr. R. F. DAVIS rose with considerable diffidence to address them, after the able manner in which the subject had been handled by Mr. Scrivenor, and by his friend Mr. Bird, whom he had been delighted to see get up to address them, as no gentleman was more competent to deal with the question. If they looked a little into the effects of the French tariff on pig-iron, they would find that it added 1*l.* 15*s.* 4*d.* a ton to its cost. One object of the discussion in which they were then engaged was not to demonstrate how cheaply they could make iron,—not to show others how badly they were off for want of it; but to explain to their friends across the water that their own interests were bound up in the obtaining a reduction of the duties on iron. There could be no doubt that such a reduction, while benefitting other countries, would also benefit this, because he believed there was no country in the world which possessed so close an approximation of the materials for the manufacture of iron; such a genial climate—such able hands—and so great an amount of capital to employ in the manufacture. It, therefore, became their duty to show to others that they were suffering by the imposts upon English iron. If a labourer had only to pay 1*s.* for the iron-work of his spade, for which he now paid 2*s.*, both himself and his country would be benefited. If they could show to their friends and neighbours, the French, that these duties were only benefitting a class, whilst they were naturally injurious to the general interests of the country, they would be doing them good service, whilst they were also promoting their own interests. The duties on the import of iron into France increased its price cent. per cent. When, therefore, Mr. Scrivenor said that these duties did not interfere with the development of the iron trade, as Mr. Bird had clearly shown, he evidently laboured under a great mistake. Whilst the French were making iron roads, what were they doing? Why resorting to expedients to evade the duty. Thus, if the Great Northern Railway of France bought 100,000 tons of iron rails in this country, upon their delivery a drawback, or reduction of duty, was allowed to the company, in order to bring it to the price of that of the French manufacturers. If, therefore, the price in France were 12*l.* per ton, and the iron could be delivered from this country at 8*l.* 10*s.*, or 9*l.*, would it not be clearly a profit to the Railway Company, and consequently to the country, if the tariff duties did not exist? In fact, the operation he had described was just the same as though the London and North Western Company were in want of a great quantity of brandy for any purpose, and were to apply to the English Government to let them introduce it at 5*s.* instead of 15*s.* per gallon duty, because the latter was too high for railways to pay. If the French nation at large were made to see that they could not get a proper wheel to a barrow—that their agriculture was crippled for the want of iron ploughs—and that they could not obtain the advantages of water or gas as they might otherwise do, for the want of iron to make the pipes—facilities they might obtain from this country, he had no doubt they would press on their government the necessity of repealing the tariff, and thereby benefit themselves and this country at the same time. He was sorry to have to go further with the argument, but he did so because he thought the subject most important; and if it were desirable for this country to get a good customer, it was more desirable that their neighbours should also get a good article cheaply. His friend, Mr. Bird, had alluded to the great difficulties which existed in other countries to the transit of iron, where there were nothing but horses and carts to be employed. Was it not curious, then, that there was no proper communication between the great seat of the iron manufacture of England and London. If they wanted a ton of iron conveyed from South Wales to London, they must employ a horse and cart, unless, indeed, they forwarded it by sea. It was only the other day the Government entered into a contract for the supply of a quantity of

a peculiar quality of iron, and they were obliged to wait for it for several days, because the horses and carts were so engaged, that they could not be obtained for its conveyance. That arose from the circumstance that the means of conveyance which was the most delightful, all for passengers who travelled by it, stood in the way of improvement, the only railway communication with South Wales being by the broad gauge. If they were allowed a narrow gauge into the district, they could very shortly open an iron road in communication with the rest of England, instead of having, as they now had, to depend upon horses and carts in the centre of the iron district. He would now briefly touch upon the subject alluded to by Mr. Bird, of the necessity of their iron manufactures being well represented at the Paris Exhibition, and he hoped the subject would not be lost sight of by the manufacturers. He did not know a better way of showing the impolicy of the tariff than by having iron well represented at the Exhibition, with its price marked upon it. If a Frenchman saw that he could get as good an article from England for 6*l.* as he was charged 10*l.* for in France, he would begin to ask why he should pay the additional price, and it would go a long way towards obtaining a reduction in the tariff. Sardinia was itself a producing country, and yet they sent to England for pig-iron with which to improve their own; though, of course, from its high price, they used but a minimum quantity. If the Sardinians could get the pig iron cheaper, they would not mind the duty being taken off, but would take the chance of competing with it. The axe in the wilds of America, and cheap iron in the old country, were at once advancing the cause of civilisation. Indeed, he might say, that the use of iron was a fair index to the civilisation of a country—as with the use of iron, civilisation and comfort advanced, and, therefore, he wished to impress upon all the necessity of taking off all trammels upon its use, as it was to the freedom of iron from impost that the Arts, Manufactures, and Commerce, in a great measure, owed their existence in this country.

Mr. G. F. WILSON had listened to the very valuable paper of Mr. Scrivenor with great attention, and there was only one remark which he wished to make with regard to it. In one portion of his paper Mr. Scrivenor had alluded to the great difficulties the iron masters had to contend with as regarded labour, more especially in Staffordshire. He was acquainted with one of the largest manufacturing iron firms in Staffordshire, who had been making experiments to get a hold over their workmen. He referred to the Messrs. Bagnall, of West Bromwich, and they had proved that the men were generally amenable to kindness, and, if so treated, came cheerfully under control.

The CHAIRMAN had listened with the greatest interest and entire satisfaction to the very able paper presented to them, and the equally able discussion by which it had been followed. It was not a subject on which he could pretend to any particular knowledge, but no person could have listened to the paper, or the discussion, without learning something. He might, however, be allowed to make a few general observations, showing how historical facts tended to illustrate great principles. It was a curious fact that one of the greatest statesmen of the day should, whilst young in life, have proposed an excise duty upon iron. He believed that now, if any one was to repeat the proposition, it would be looked upon as one of the most curious and outrageous features of the day. Whatever might have been the opinions with regard to it as a war tax in 1806, there could be no fear that it would ever be proposed in 1854. One of the greatest politicians had denied that there was any natural effect by the reduction of duties on consumption and production. He (Mr. Wilson) held that the iron trade was an extremely happy illustration, and one of the greatest proofs of the truth of his principles. He believed that it was not by protective duties that industry could be encouraged—but that, on the contrary, produce was reduced by imposts and restrictions. He

recollected that in 1823—and it was one of the oldest things he did recollect—that in the discussion in the House of Commons to which Mr. Scrivenor had alluded, on the introduction of the bill of Mr. Herries, at a time when the annual production of iron was only 45,000 tons—he recollected that an old and valued friend of his at that time—one of the most distinguished iron-masters—making a remark founded upon his observations and experience of the largest trade of the day. That hon. friend of his declared that, in his opinion, if the bill was passed into law, two years would not elapse before every blast furnace in the kingdom would be extinguished. And what was the result? why in six years it was found that the production had increased to 76,000 tons: and since the reduction of the duties, so rapid had been the progress of the trade, that the make of iron had increased from 450,000 tons in 1823 to 2,700,000 tons in 1852, and it was now stated to be about 3,000,000. If the United States and France possessed the inherent means of producing iron—and there could be no doubt the United States did so—and they wanted to develop their resources, they should begin by the reduction and repeal of the duties on the manufacture. They could now, fortunately, see the force of these great principles, and allude to them without being charged with interfering in politics—they being now universally acknowledged and appreciated as having conferred the greatest benefits upon England. These questions were, in fact, now looked upon as English, not political. He thought that it was self-evident, that the benefits thus secured, not only did good to the producer, but to the consumer. The benefits must be mutual to all parties concerned in the trade, the producer, the merchant, and the consumer; and it now appeared to be generally understood that the prosperity of a country depended upon free trade and free transit. That had been the cause of the advance in the iron trade, though their later progress might have somewhat depended on the value of iron as compared with the rates of exchange. There was one remark which had forcibly struck him as tending to clear away the mist and exaggeration with which the iron trade was surrounded. When they saw particular cycles in trade in which an article was rising 10 or 20 per cent. annually in the amount consumed, succeeded by a mania like that of railways, they became naturally afraid of a revulsion. There could be no doubt that in its progress from protection to freedom, the iron trade had been subjected to revulsions, and they found that distress had occasionally existed in the iron districts, and it was because of their large population that they laboured under some apprehensions on the subject. There had been a remark made, however, which he thought ought in a great measure to relieve them from apprehension—for though the iron districts, like all others, must still be subject to fluctuation, yet, that remark showed that the trade was in the main founded on a solid basis. Mr. Simmonds had remarked, that all the railways in the kingdom only contained 1,500,000 tons of iron; but Mr. Bird had improved upon the remark by showing that they contained 2,500,000 tons. When, therefore, they came to see that the make of iron for the year was upwards of 3,000,000 tons, they would see that the railways could not have exerted any very material influence on the trade, as the whole of the rails yet used was not equal to one year's produce of iron. That was a fact calculated to show them, that it was not upon railways or any peculiar department of the trade, they must chiefly rely, but upon the cheapness and perfection of their make, rather than occasional speculation, though that might produce a temporary effect upon prices. There was another observation of Mr. Bird's, relative to the renewal of rails, which was worthy of notice. That gentleman showed them that the wear and tear was likely to produce a continued demand upon the iron trade, of from 200,000 to 300,000 tons per year, or about ten per cent. on the whole produce, so that every mile of railway laid down carried with it a benefit to the

future trade. That, he considered, proved the iron trade to be in a most sound and felicitous position; and when they saw industry expanding, and knew the various purposes to which iron was now applied, they would easily understand that it was more to the facilities offered by the railways for transit than to their construction they were indebted for their position. Some valuable observations had been made with regard to the Exhibition of 1851, and he was glad that the value of such institutions had been shown in that room—institutions of which their own Society might be said to be the foundation and representative—in bringing mankind together, and strengthening the bonds of thought and union throughout the world. It was not only, however, thus that they were beneficial; but by showing to others that which they could best do, they promoted alike the interests of the country and of labour. He thought that two great advantages must result from such meetings and gatherings—the extension of the principles of free trade and free institutions;—and he believed that wherever free trade existed, free institutions would be found to be not far behind. There was one advantage to be derived from these meetings, that they tended to show the true principles which should govern legislation in manufactures and finance—and to show that the true principles of prosperity consisted in the perfect freedom from imposts and enthrallment of all articles on which the comfort and convenience of the people depended. He recollected an observation of M. de Tocqueville, that “no one understood the object of keeping up the price of iron.” It was not alone in the price of iron that France suffered by these imposts, but they lost upwards of 2,000,000 in their agriculture. It was not only the high price of iron, but the awkward substitutes that they had to make use of, that told against them. Thus a wooden plough, or a wooden wheel, where iron ought to be supplied, caused a loss by their inefficiency. He was sure that, from meetings like the present, where discussion could be had upon these subjects, great benefits would arise; and it had given him great pleasure to be present, and profit by the discussion, as all must have profited who had heard it. He was sure, before he resumed his seat, they would all unanimously agree with him in awarding a vote of thanks to Mr. Scrivenor for his very valuable paper.

MR. SCRIVENOR, when he entered the room as a stranger, was not at all aware of the manner in which the subject he had to bring before them would be treated. He was much gratified by the way in which the discussion had been conducted, and the fairness with which his views had been listened to and discussed. With respect to the great increase which had recently taken place in the exports, he was not unacquainted with it, though he had not alluded to it, not having the official papers by him; and he had rested all his statements on official documents; but the increase which had taken place in 1853 and the present year only went to strengthen and confirm his arguments. He must be allowed to observe that he had not intended to say that the duties on iron should not be done away with, because he thought all such duties ought to be removed; but seeing the large reductions which had lately taken place, he did not think it likely that they would for the present be further reduced, and therefore he did not think it necessary to enlarge upon the subject. When however he saw that iron ore in Staffordshire was at 22s. per ton, and coal at 10s., he did not think so much good would be derived from their being in the Exhibition as some gentlemen appeared to believe. He was glad to hear that the men in Staffordshire were so easily managed and he hoped the gentlemen alluded to would benefit by the improvement in their treatment.

The Secretary announced that at the meeting of Wednesday, the 20th instant, the following

Paper would be read:—"On the New Process of Printing Bank-Notes by Surface Printing from Electro-types," by Mr. Alfred Smee, F.R.S.

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PROPERTY OF INSTITUTIONS.

In answer to a correspondent, signing himself "F.," the Secretary begs to state that, under section xx. of the "Literary and Scientific Institutions Act," 17 & 18 Vic., c. 112, the books and other personal effects of a Mechanics' Institute are vested in the governing body, except when, by the rules, they are vested in the trustees, and except the Institute be incorporated by charter, having special provisions relating to such property. Under section xxi. of the same Act, an Institution (unincorporated by charter) can sue and be sued in the name of the president, chairman, secretary, or clerk, as the rule may determine; and if no rule, then in the name of such person as the governing body may appoint for the occasion; and if no person be nominated, then the president or chairman may be sued on the section xxvi. A member embezzling property of the Institution, is punishable as a stranger. No enrolment is necessary.

Home Correspondence.

PROPOSED CONGRESS IN PARIS ON AN INTERNATIONAL CODE OF COMMERCIAL LAW.

The following correspondence has been handed to the Secretary for publication:—

12, The College, Doctors' Commons,
London, 18th November, 1854.

MY LORD,—When I had the honour to meet your Lordship at the Statistical Congress, held at Brussels, in 1853, we had frequent conversations on the subject of an International Code of Commercial Law, and your Lordship kindly supported the resolution passed by that Congress, expressing a wish and trust "that the great differences now existing in the mercantile legislation of different countries may be diminished, if not altogether removed." In a paper which I laid before the Congress, and which was published in the appendix to the official

report of the Congress, p. 202, I suggested that a special Congress of Deputies from all Chambers and Tribunals of Commerce, from the most important mercantile places in the civilised world, should be held in Paris at the time of the Great Exhibition in 1855, to lay the basis of an International Commercial Code. The Society in Edinburgh, for the promotion of such an object, have considered such a proposal of the highest importance, and have entrusted me with the presentation of an address on the subject to his Majesty the Emperor of the French. I regret that I was unable, before ascertaining what instructions His Imperial Majesty might confer on the subject, to communicate it to your Lordship, in order that some allusion to the subject might be made in the address which your Lordship recently gave, as Chairman of the Council of the Society of Arts. I have since had the honour to receive a despatch from the Minister of State, M. Fould, dated the 8th instant, informing me that the Emperor took a personal interest in the address of the Edinburgh Society, and that the documents presented were, by his commands, remitted to the legislative section of the Council of State, with instructions to report thereon to the Emperor. From the contents of such a communication, and from other circumstances which have come to my knowledge, I have reason to hope that his Majesty will sanction the holding of the proposed Congress, and I have now the honour to transmit a copy of the address to his Majesty, and the answer received from the Minister of Commerce, for your Lordship's serious consideration.

I cannot over-estimate the important bearings of such an European Congress, both as regards the interests of commerce and the development of jurisprudence, and I would hail it as one of the most momentous events of the present century. It seems to me that the subject might come appropriately within the province of the Society for the Encouragement of Arts, Manufactures, and Commerce; and I would submit to your Lordship whether the Council of the Society should not take some steps with a view to express their sympathy for and deep interest in the promotion of an International Code of Commercial Law, especially as it would have the effect of enlarging the commercial relations between this country and France. The Council of the Society might, moreover, communicate with the President of the Board of Trade their views on the subject, in the hope that the British Government may afford to the French Government assurances of their readiness to send representatives to the same Congress. The Commission issued by Her Majesty's Government for assimilating the mercantile laws of the three United Kingdoms, would be enabled by such a Congress to learn the results of European experience on all the doctrines of mercantile law; whilst the proceedings of such a body would go far to settle many questions where much difference of opinion prevails.

I believe that a subject embracing such comprehensive interests affects deeply every section of this great commercial empire, and I would appeal, through your Lordship, as Chairman of the Society of Arts, to all the members of this Society, and especially to the Chambers of Commerce, and to the numerous Institutions in Union with it, to lend their powerful influence in promoting a Congress which is, on every ground, likely to prove of immense benefit to the Commerce, and, through Commerce, to the productive industry of the whole world.

I have the honour to be, my Lord,
Your Lordship's most obedient servant,
LEONE LEVI.

Right Hon. Viscount Ebrington.

Castle Hill, Southmolton, Nov. 20, 1854.

DEAR SIR,—I have to thank you for your letter, and beg to return the accompanying documents. You do no more than justice in attributing to me a deep interest in

the subject of them. I deeply regret with you that the proposal of a Congress at Paris next year for laying the basis of a General International Commercial Code, was not, when I wrote my address, in such a position as to allow of my alluding to it there. Could I have been made aware in time of the auspicious reception which the proposal met at the hand of the French Emperor, and of his Imperial Majesty having referred it, with the copy of your admirable work just presented to him, for the consideration of the Legislative Section of the Council of State, I should certainly have taken occasion to mention the project as one of the subjects in which, in connection with the Exposition Universelle of 1855, we, in our capacity of a Society for the Encouragement of Commerce should be bound more especially to interest ourselves, though, indeed, along with its advancement, Arts and Manufactures could not fail also to be thereby benefited.

I hope, however, that the movement for the promotion of this admirable plan will not be confined to the enlightened memorialists of Edinburgh, but that many, if not most, of the Institutions in Union, will before long bestir themselves in its behalf. I am confident that in so doing they would consult not only the general interests of civilisation and progress throughout the world, but also pre-eminently the special interest of every class in this country, for, without commercial prosperity, our manufacturing and mining interests must languish, and without mining and manufacturing prosperity, how can our agriculture find good customers for its produce? Wishing you every success in these and all your other labours in the great cause you have so distinguished yourself by advocating,

I remain, dear sir, yours faithfully,
Leone Levi, Esq. EBRINGTON.

THE LAW OF LIMITED LIABILITY IN PARTNERSHIPS.

SIR,—A physician has been somewhere defined to be an unfortunate person whose business it is to make health reconcilable with intemperance; so a patriot and a reformer may be defined—one whose business it is to make worldly prosperity reconcilable with indolence and folly. Both attempts are against the law of nature—one the physical, and the other the moral law—and they will never succeed. The proposed law of limited liability is, so far as this country is concerned, a new recipe, a new expedient, to enable people to get money, or great interest for their capital, small or large, some 10 or 15 or 20 per cent., without work, care, thrift, self-denial, or adequate risk. You advocate this fascinating project; and I infer, from a note in his lecture, that Mr. Mechi, a really practical man, is also an advocate; this I regret. I am not surprised when lawyers, philosophers, literateurs, poets, painters do so, but I am dismayed when men who have had a life-long experience in affairs forget the true difficulties which beset their early career. It is not that they ever wanted capital at large rate of interest, 10 or 15 per cent., a certainly ruinous rate—but that they wanted capital at reasonable living interest when they were young in life, and before they had been long enough in the market under the eyes of men to create a character, to give outward and visible signs—assuring to capitalists of their being persons of industry and thrift (homely vulgar qualities) and honesty, for when these are known to be possessed, capital in some shape or other is not wanted long; for capital more desires to unite itself with men of such qualities, than do such qualities wait the union with capital. It is only people who are without these qualities altogether, or who will not wait the due ripening time to develop and colour them before the world who want a law of limited liability to enable them to borrow money wherewith to carry out their projects at a ruinous rate of interest.

Money by the million is wanted, no doubt, in farming affairs, just as it is wanted in a multitude of other trades,

but it is wanted because farmers (and others) cannot assure men of their aptitude to be entrusted with money; those who are esteemed trustworthy can borrow of country bankers to any reasonable amount, at four or five per cent. interest, in small or large parcels, from time to time, just as they require help, a watchful eye being kept on their mode of farming, on their style of living, on their deportment on the market day, whether they come there for real business, or whether the business is the pretence, and a long long frolic at the tavern their real object "in going to market." Mr. Mechi says, and no doubt he is correct, that he never loses his live stock by disease, but that such is the risk of loss with common bad management that Insurance Companies charge 20 per cent. premium; and that bad buying and selling to the amount of 5 per cent. would make a difference to him, on his 400 acres, of £250 a year; none but a very foolish person, then, would enter into a limited liability partnership with a farmer, (character unproved) where bad management causes such ranges as these. One hundred tickets in the lottery would bring a larger average gain than so many shares in farms! Farming is a trade which seems singularly unsuited to partnership of any kind; there are few partnerships among doctors, fewer still among farmers, because men cannot associate their skill. Skill, either in physic or agriculture, is a unit; it is in one man's own head, and he cannot divide it with another; labour and money may combine, but not skill of judgment.

Farmers do not make the gains they should do, because, like other persons, so many of them are deficient in skill and energy; they want already to get profit and sleep themselves; a sleeping partner would only make such things worse; and, besides, they do, as most other persons do, trade beyond their capital;—with a fortune of £2,500 they take 400 acres, which, according to Mr. Mechi, is just 200 acres too many. Again, any large investment in farming, i.e., high farming—means, too often, investing capital in another man's land, who, it is feared, will get too large a share of the investment in the end; the evil is in the tenure of land, and while the lawyers want limited liability, they cloak the real grievance. No small portion of farming improvements is of a nature that a tenant would be unwise to make at his own cost to any great extent—draining, squaring fields, good roads, good barns, cattle sheds, and outbuildings. A man would be a fool who, under limited liability, advanced his money to be expended on such very needful and very gainful improvements. There is too much of this already—the tenant leaves too much of his capital buried in the earth, only to earn an improved rental for his landlord. No doubt landlords, who themselves are poor, for the same reason that they lack industry and thrift, should save of their rent rolls, and make profitable investment in improving their estates. It would be a nice thing, truly, for them and their lawyers, if under a law of limited liability, greedy widows, spinsters, and retired tradesmen, could join in taking a farm, their capital buried in fixed improvements which the tenants cannot take away nor get adequate allowance for, but which would yield profit during the tenancy to be eaten up and enjoyed. Plenty of persons, silly enough to do all this are to be found—fools are thick as blackberries—and it is to induce, coax, such persons to risk absorbing their capital, that so many lawyers are agitating for limited liability. People must believe that they cannot get large interest for their own money but by industriously using it themselves, other people must assuredly will not earn large interest for them; and those who do not like to work must be content to take relatively small interest, such as the funds or mortgages yield, or be content to lose their money altogether.

Your correspondent, who writes so instructively on the manufacture of bread, says that millions might be well invested in the baking trade. This opens another chapter on thrift and industry, virtues so much desiderated by all working traders, especially including bakers. It is not limited-liability that bakers want, to be out of the power

of the miller, but self-denial. Nor does it seem very promising that such a trade—a working trade—can be managed profitably by a company, seeing the fate of the League Bread Company.

In another part of your Journal, complaint is made that joint-stock projects are in abeyance because of the law. Really this is no matter of regret—all the hundreds of millions that are invested in railways do not earn more than fund-interest, and other schemes of a less stable nature average even a less interest. The area for joint-stock schemes fills up every day, and it is not good, under the lure of limited liability, to tempt timid, thrifty fools to part with their little hoards, not a five per cent. of which will ever be returned to them again. Let all such work their own capital, or let them be content with three pounds per cent. per annum, which is really and truly enormous *lazy* interest for a man to get year by year without labour or risk; it is, in fact, the largest interest the world ever knew. One hundred pounds will now earn a man more interesting goods than it ever did in the history of this country. Men must not talk about the *low* rate of interest—they must rather rejoice in the very *high* rate of interest.

I. H. ELLIOTT.

CAST AND WROUGHT IRON GUNS.

SIR,—The lump of cast-iron with a bore and a touch-hole, which has been in use for some centuries without any material improvement, is now found to be incompetent to the requirements of modern artillery practice. The cast-iron gun was originally an improvement upon the first form of cannon, a rude assemblage of staves and hoops of wrought iron; and one of our eminent engineers has advocated a return to that metal; but as long as cast-iron remains the only available material for shot of large calibre, soft iron will be more subject to wear and tear than cast.

The defects of the present gun are the deterioration of the structure of the metal itself by long continued and rapid firing, the irregular enlargement of the bore, and the blowing of the touch-hole. Durability and strength are only to be obtained by constructing the body of the gun of two different metals, a steel lining for the bore, and a cast metal jacket outside to give weight and strength. As the construction of such a gun might appear to involve formidable difficulties, I feel it incumbent upon me to describe one mode at least by which it might be accomplished with comparative ease in our large foundries and ironworks.

Prepare a mandril rather less than the intended bore, also a tapering bar of steel, for heavy guns at least two inches square at the butt. After scarfing the thick end, cause it to be rolled, by means of powerful machinery, while red hot, round the mandril, when, if the steel bar has been properly shaped in its cross section, the faces of the spirals will be accurately applied to each other from inside to outside. Then drive out the mandril, bring the spiral coil to the welding heat in a large reverberatory, and close the weld by jumping or with blows on end under the steam-hammer. The steel tube, when completed, must then be heated, and placed in the usual mould for casting the jacket round it, when, from heat and contraction, the whole will become one solid mass of metal. For light guns, brass or bronze may be used, and for heavy cannon cast-iron.

—In order to centre the lower end of the steel tube or bore, a turned dovetailed plug, also heated, must be enclosed in the breech of the mould with a rabbet to fit the end of the tube. By this construction, the boring of the gun will be much simplified, it will be the same, in fact, as that in common use for boring musket barrels, only on a larger scale.

Steel, in its soft state, is far tougher than wrought-iron,

and equally less brittle than cast iron, therefore the bore so lined will be greatly more durable than in guns of either cast or wrought metal. Nothing, however, will resist the bad effects of rusty ill-cast shot, which are seldom truly spherical, and never smooth. I have lately published a method, not my own, of producing perfectly smooth cast-iron bullets, which is as follows—as soon as the shot is set, but still red-hot, it is shaken out of the iron mould into a trough or channel, which conducts it under a rapid tilt-hammer, the face and anvil of which are turned into hemispherical hollows, and while the hammerman turns the shot swiftly round with peculiarly shaped tongs, a pipe, with a watering-pot rose, directs a fine shower of cold water over all. In a few seconds a truly spherical and perfectly smooth globe is turned out as if from a lathe. The shot, while still warm, should be immediately plunged into boiling asphalte or marine glue, either of which will preserve it from rust for years.

In order to remove or lessen the inconvenience of the blowing of the touch-hole, nothing more will be necessary than to drill a hole of about two inches in diameter where the touch-hole should be, down to the bore, and tap it throughout with a good breech screw, into which may be screwed any number of plugs of any metal, with the true touch-hole ready drilled. The plugs should have a squared part at top, raising a little above the surface of the gun, for the application of the wrench or spanner, or it may be left round for gas nippers.

The extra cost of artillery constructed according to this or any similar plan can be no object, because good guns that will resist wear and tear will be more economical than bad, and any step that may have a tendency to shorten the evils or duration of warfare must be a step in the right direction.

A CIVIL ENGINEER.

November 30, 1854.

THE ADULTERATION OF FOOD—BREAD.

SIR,—I sit down to make a few observations in reply to Mr. Reveley's article on the adulteration of food.

In the first place, it is positively wrong that any miller will give more for *old heated* wheat than for new; indeed, heated wheat is so objectionable, that we always avoid buying it, unless at a low price.

I believe it is correct that alum gives the bread a better appearance, but I cannot think that large quantities are used, neither do I think that it increases the "water holding" quality of the flour.

I never heard of bakers' chemists, but there are manufacturers of what is called "permanent yeast," who supply such bakers as do not know how to make it themselves. I believe it is made of yeast, malt and hops.

It is quite true that millers use alum, mixed with stone dust, to fill up the pores of mill stones; and I may add that it costs me 4s. or 5s. per annum to supply my nine pairs of stones. I am quite sure it does not cost more, nor have I ever seen a larger quantity introduced into any mill I was connected with.

I should say wheat ground at the rate Mr. Reveley speaks of would not be half-ground, and consequently would not produce any thing like the quantity of flour that is made from our mode of grinding. I consider four bushels per hour a fair quantity for a pair of four-foot stones to grind. It is possible to run seven or eight bushels through the stones in the hour, but not to grind it properly.

I should think Mr. Reveley's letter will call forth observations from others in the trade.

Yours truly,

H.

12th Dec. 1854.

Proceedings of Institutions.

DERBY.—The annual general meeting of the members of the Working Men's Institute was held on the 28th of November, Mr. W. Hirst, the treasurer, in the chair. The report of the committee stated that the number of members had increased, and the classes had been considerably augmented during the past session. The following classes were now in active operation, and were uniformly well attended,—grammar, geography, reading, writing, and arithmetic. The library contains 600 volumes, and the reading-room is well supplied with newspapers and periodicals. Readings or short lectures were delivered every Thursday evening, and during the winter occasional lectures. The treasurer's balance-sheet showed an increased income during the half-year, and left a balance in hand of £5 17s. 6d.

NOTTINGHAM.—The first of a course of lectures for the season was delivered on the 24th of October, by the Rev. W. J. Butler, M.A., "On the Dead Sea and Cities of the Plain." The course comprises thirteen lectures, to be delivered fortnightly, and to which the members of the various Operatives' Libraries in the town will be admitted free. On the evenings of October 30, Nov. 1, 6, and 8, Professor Partington delivered a course of four lectures, "On the Progress of General Science, and the adaptation of the improvements to the useful arts." To this course of lectures working men were admitted at 1d. each, and a considerable number availed themselves of the opportunity of enlarging their circle of knowledge.

SHEFFIELD.—The sixth annual report of the People's College states that the average weekly attendance shows an increase upon that of last year. The number of students upon the books has been 472 males and 82 females, making a total of 554. There have been 36 classes in operation. Classes for reading, writing, and arithmetic are in operation every evening, for those whose early education has been neglected; and there are also classes for the study of grammar, drawing, geography, book-keeping, singing, elocution, composition, logic, French, and German. The committee contemplated the formation of industrial classes, and, in order to test the feeling of the public generally towards such classes, the late Mr. James Haywood delivered a course of lectures to the students and the public, in the Council hall, "On the Application of Chemistry to the Sheffield Trades." These lectures were so far successful that the Committee were emboldened to proceed with the plans, when the unforeseen and melancholy death of Mr. Haywood altogether frustrated their designs. The Committee have not abandoned the idea of forming industrial classes, but see no immediate prospect of carrying out this important branch of education. The receipts during the year have been £220 10s. 2½d., and the expenditure £217 13s. 2d., leaving a balance in the hands of treasurer of £2 17s. 0½d.

TENTERDEN.—A lecture in connection with the Mutual Improvement Society was delivered at the Town-hall on the 30th ult., in aid of the Patriotic Fund, by the Rev. E. Talbot. The subject was "On the Cloth Manufacture at Tenterden during the reign of Charles I."

Miscellaneous.

THE SUPPLY OF GUM.—The last American papers contain an account of an apparently important discovery in the far west. It is asserted that in the north of Texas, towards Arkansas, as well as in the state of New Mexico and the adjacent territory, gum has been found in inexhaustible quantities, and of a character scarcely, if at all, inferior to that imported from the East. It is gathered from the mezquite tree—a kind of acacia, abundant in that section of the country, especially in elevated and

dry localities—and exudes spontaneously in a semi-fluid state from the bark of the trunk and branches, soon hardening and becoming nearly colourless by exposure. July, August, and September are the months for collecting it, and the quantity from each tree varies from an ounce to three ounces, which may be greatly increased by incisions. Even as it is, a good hand, it is said, would probably be able to collect from 10lbs. to 20lbs. a-day. Should it command one-half of the prices paid for gum arabic, the gathering of it will, in the opinion of the United States Superintendent of Indian Affairs, by whom it was tested, afford employment to thousands of wild Indians of the plain, so as to constitute it a most valuable article of traffic on the western frontier.

To Correspondents.

In No. 106, page 33, col. 1, line 26, for *Tartons*, Charles—read *Sartoris*, Charles.

MEETINGS FOR THE ENSUING WEEK.

- MON. Chemical, 8.
Statistical, 8.—Mr. Horace Mann, "On the Statistical Position of Religious Bodies in England and Wales."
TUES. Civil Engineers, 8.—Annual General Meeting for Election of Officers.
Linnæan, 8.
Pathological, 8.
WED. London Institution, 7.
Society of Arts, 8.—Mr. Alfred Smee, F.R.S., "On the New Process of Printing Bank-notes by Surface Printing from Electrotypes."
THURS. Numismatic, 7.
Antiquaries, 8.
Royal, 8½.
FRI. Philological, 8.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS,

Delivered on 13th Dec., 1854.

- Par. No.
2. Barnstaple Borough: Special Certificate.
Session 1854.
411 (1). Conveyances of Mails by Railways: Index to Report.
418. Nizam's Territory: Papers.
462. Bank of England, &c.: Returns.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, Dec. 8th, 1854.]

- Dated 10th October, 1854.*
2168. G. W. Knocker, Dover—Motive-power.
Dated 17th October, 1854.
2216. G. and E. Scheutz, Salisbury-street—Calculating machinery and printing results.
Dated 15th October, 1854.
2225. W. Eassie, Gloucester—Securing goods on and loading railway trucks.
Dated 9th November, 1854.
2374. J. Halliday, Manchester—Carding machine. (A communication.)
2379. J. R. and T. Berry, Rochdale, and T. Roysds, Salford—Spinning machinery.
Dated 10th November, 1854.
2390. E. A. Lépine, Madrid—Ophthalmological powders and collyrium.
2393. J. Wain, Oldham—Spinning machinery.
Dated 17th November, 1854.
2434. R. Peters, 89 Union-street, Borough—Steam engines.
Dated 20th November, 1854.
2450. J. Cumming, Glasgow—Looms.
2452. R. Reeve, Trim, Ireland—Dressing flour.
2454. W. B. Adams, 1 Adam-street, Adelphi—Projectiles and projectile weapons.

Dated 21st November, 1854.

3456. T. Craig and A. Daniels, Manchester—Railway signals.
 2458. F. Russell, Massachusetts—Mowing machine.
 2460. A. Tylor, Warwick-lane, Newgate-street—Crimping machines.
 2462. W. L. Thomas, Anderton, Devon—Projectiles and gun wads.

Dated 22nd November, 1854.

2464. R. Terrett, Hercules-buildings, Lambeth—Knife-cleaning machine.
 2466. J. H. Johnson, 47 Lincoln's-inn-fields—Incrustation of steam-boilers. (A communication.)
 2468. C. Gibson, Draycott, Derby—Brick and tile making machinery.

Dated 23rd November, 1854.

2469. W. Hurst, Salford—Railway chairs.
 2470. J. Wright and J. Walmsley, Alfred-place, Newington-causeway—Bedsteads.
 2471. W. A. Vérel, Macduff, N. B.—Grinding bones.
 2472. E. Eaborn and M. Robinson, and J. Kendrick, Birmingham—Apparatus for holding hats in public assemblies.
 2474. G. Collier, Halifax—Mohair plush.
 2475. G. Collier, Halifax—Pile fabrics.
 2476. S. Shaw, Plaistow—Marking metal plates, and new template.
 2477. J. B. Hellier, Schelestadt, France—Spinning machinery.
 2478. C. W. Ramee, Jersey—Razor straps.
 2479. H. J. Duviervier and H. Chaudot, Paris—Treating gutta-percha.
 2480. E. Edlund, Stockholm—Electro-magnetic telegraph apparatus.

Dated 24th November, 1854.

2481. S. A. Carpenter, Birmingham—Buckle. (A communication.)
 2483. R. Cunliffe, Accrington—Brick and tile making machinery.
 2484. R. William and D. Mills, Blackburn—Looms.
 2485. J. Hartley, Sunderland—Perforated glass.
 2486. C. M. T. du Motay, Paris—Treating soap.
 2487. W. Ely, 38, Broad-street, Golden-square—Ball cartridges.
 2488. J. D. M. Stirling, Blackgrange, Clackmannan—Metallic tubes.
 2489. H. Bessemer, Old St. Pancras road—Projectiles and projectile weapons.
 2490. T. De la Rue, Bunhill row—Compositions for printing rollers.

Dated 25th November, 1854.

2493. J. Henderson, Lasswade, Midlothian—Carpets.

Dated 27th November, 1854.

2497. P. A. le Comte de Fontaine Moreau, 4, South-street, Finsbury—Inkstands. (A communication.)
 2499. F. Delacour, Paris—Fire screens.
 2501. J. Crofts, and W. Cartwright, Birmingham—Projectile.

WEEKLY LIST OF PATENTS SEALED.

Sealed 5th December, 1854.

1291. Antoine Louis Péter, Lyons—Improvements in treating a certain kind of indigo.
 1313. Frederick John Julian, 20 Gerrard-street, Soho-square—Improved methods of producing musical sounds.
 1340. William Brunton, Camborne—Improvements in metallic pistons.
 1385. Auguste Edouard Loradoux Bellford, 16, Castle-street, Holborn—Improvements in machinery for picking or opening cotton and other fibrous materials, and all kinds of waste rags and old materials, to prepare the same for the operation of carding, or for other operations.
 1423. Edmund Cockshutt, Preston—Improvements in bungs or adjustable stopper apparatus for casks and other vessels.
 1491. William Pole, Storey's-gate, Westminster—Improvements in the construction of railways.
 1758. Walter Blundell, 29, New Broad-street—Improved apparatus for treating or preparing any part of the human body requiring to be surgically operated upon for the purpose of totally or partially benumbing the sense of feeling at the desired part of the human body.
 2009. Samuel Collins, Birmingham—Improved castor for furniture.
 2024. Alfred Tylor, Warwick-lane, Newgate-street, and Henry George Frasi, 84 Herbert-street, New North road—Improvements in water-closets.
 2073. John Simon Holland, Woolwich—Improvements in large and small fire-arms, and in the preparation of their charges.
 2173. Pierre Etienne Proust, Orleans—Apparatus for greasing or lubricating axles and other rotating portions of carriages and of machinery.
Sealed December 12th, 1854.
 1304. John Edwin Piper, New-road—Improvements in the preparation of linen, cotton, and other fabrics, to produce a facititious leather.
 1307. Thomas Mara Fell, 74, King William-street, and William Cooke, Curzon-street, St. George's—Improvements in ventilators.
 1325. John Allin Williams, Baydon, Wilts—Improvements in machinery or apparatus for ploughing and cultivating land.
 1326. Auguste Edouard Loradoux Bellford, 16, Castle-street, Holborn—Improvements in water-mill machinery.
 1343. Charles Reeves, Birmingham, and William Wells, Sutton Coldfield—Improved method of manufacturing certain kinds of metallic tubes.
 1356. John M'Innis, Liverpool—Improved composition for coating the bottoms of iron ships to prevent their fouling, and other useful purposes.
 1392. Robert Michael Letchford, Whitechapel—A match stand and holder for holding matches while being ignited.
 1394. Thomas Skelton, Plaistow—Improvement in or addition to tillers or yokes.
 1395. Richard Archibald Brooman, 166 Fleet-street—Improved projectile for ordnance and small arms, and a sabot or plug to be employed therewith, which sabot or plug may also be used with other projectiles. (A communication.)
 1397. Richard Archibald Brooman, 166, Fleet-street—Improved mill for grinding and pulverizing paints and various vegetable and mineral substances.
 1450. Peter Armand le Comte de Fontaine Moreau, 4, South-street, Finsbury—Improvements in stopping bottles and in drawing off aerated or other liquids contained therein.
 1459. Christopher Thomas Tiffany, Leeds—Improvement in the manufacture of brushes used in gig mills and machinery for brushing pile fabrics.
 1483. Peter Armand le Comte de Fontaine Moreau, 4, South street, Finsbury—Improvements in apparatus for breaking in horses.
 1500. Henry Richard Cottam, 20, Argyle square, King's-cross—Improvements in horse mangers.
 1503. Lorenzo Tindall, Scarborough—Improvements in bruising or reducing grain or other substances.
 1504. John Henry Johnson, 47, Lincoln's-inn-fields—Improvements in the manufacture of carbonates of soda.
 1519. Victor Gustave Abel Cuvier, Selon-court—Improved apparatus having for object the combustion of fuel and the utilization of the gaseous products for heating and other useful metallurgic purposes.
 1543. John Baptiste Chauvet, fils, Aix, Provence—A new system of anchor.
 1562. George Wade Kelsey, Hope farm, near Folkestone—Improvements in air engines.
 1888. John Gray, M.D., Dublin—A self-acting flushing apparatus, which may be arranged for registering the quantity of water or other liquid flowing through it.
 2103. Moses Poole, Avenue-road—Improvements in condensers.
 2119. William Blythe, Oswaldtwistle, and Emile Kopp, Accrington—Improvements in the manufacture of soda ash and sulphuric acid.
 2124. Christopher Nickells, Albany-road, and James Hobson, Leicester—Improvements in apparatus used when weaving piled fabrics by the aid of vives.
 2143. George Collier, Halifax—Improvements in the manufacture of carpets and other terry fabrics.
 2162. William Crosskill, Beverley—Improvements in the construction of portable railways.
 2174. Jean François Jules Alexandre Bouillet, La Chapelle St. Denis, near Paris—Improvements in the manufacture of steel.
 2182. James Timmins Chance, Birmingham—Improvements in manufacturing articles from the minerals or rocks of the descriptions commonly called basalt or trap, sometimes rowley-rag, and whinstone.
 2204. James Hadden Young, 66, College-street, Camden-town—Improvements in brooms or brushing apparatus.
 2228. Ernest Gessners, Aue, near Schneeberg, Saxony—Improvement in gig mills.
 2276. François Lambert, Rue d'Enfer, 72, Paris—Improvements in compounds to be used as cosmetics.
 2312. James Cooper Hall, Monkwearmouth—Improved windlass.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
Dec. 7.	3668	The Turnout Bedstead	Theodore Jones	17, Clement's-lane
„ 9.	3669	An improved Tongued Elastic Boot	{ William Collinson	{ Liverpool
			{ Henry Penketh Mather...	{ Stafford